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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/623,159 | 07/21/2003 | Hiroyuki Fujimura | 2003_1008A | 2705 |

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WILKINS III, HARRY D

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| ART UNIT | PAPER NUMBER |
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1742

DATE MAILED: 07/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--|--|--|
| Office Action Summary | Application No. 10/623,159 | Applicant(s) FUJIMURA ET AL. | |
| | Examiner Harry D. Wilkins, III | Art Unit 1742 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitation "said pyrolysis furnace" in lines 11-12. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pham et al (US 6,051,125) in view of Ito et al (JP 51-119703) and Chiaramonte (US 4,312,740) OR Keller et al (US 4,953,479) OR Shaw (US 6,736,955).

Pham et al teach (see abstract, figure 3 and col. 4, lines 1-23) a method for producing hydrogen including supplying a carbon containing gas (methane) to the anode side of a solid oxide diaphragm electrolyzer (see phenomenon 1), supplying steam to the cathode side of the electrolyzer, generating hydrogen and oxygen by electrolytic action and the oxygen produced at the cathode side passing through the diaphragm to react with the reducing gas to create a concentration gradient of oxygen

ions (see phenomenon 4). Pham et al teach preferably using methane to be fed to the anode side of the electrolyzer, however, Pham et al do suggest using any reducing gas as the anode side feed (see col. 4, lines 51-58). Thus, it would have been within the expected skill of a routineer in the art to seek out alternative reducing gases to avoid the excessive costs of natural gas (methane).

Thus, Pham et al fail to teach that the anode feed gas was a reducing gas produced in a pyrolyzer of organic material biomass, such as waste wood or raw refuse.

Ito et al teach (see Derwent abstract) the production of a reducing gas (H_2 and CO) by pyrolytic decomposition of raw refuse.

Therefore, it would have been obvious to one of ordinary skill in the art to have used the reducing gas produced by the method of Ito et al to provide the reducing gas to the electrolyzer of Pham et al because the reducing gas produced by Ito et al provided environmental benefits by consuming raw refuse.

Pham et al do not teach utilizing the high temperature gas to preheat incoming water to form the steam reactant fed to the pyrolysis device and the electrolyzer (i.e.- "supplying a high temperature gas, which is generated in said anode side of said electrolyzer, to a heat exchanger; and supplying steam produced in said heat exchanger to a pyrolysis fluidized bed of said pyrolysis furnace that produces the reducing gas, wherein the steam supplied to said cathode side of said electrolyzer is produced in said heat exchanger.").

However, it was well known in the chemical arts at the time of invention to utilize excess heat present in a product stream to preheat reactants to improve overall energy

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conservation. Examples of such knowledge can be seen in Chiaramonte (col. 3, lines 21-41 and figure 4), Keller et al (figure 1 and col. 10, lines 37-57) and Shaw (figures 1 and 3 and col. 8, lines 57-67).

Therefore, it would have been obvious to one of ordinary skill in the art to have utilized excess heat of the hot anode product gas stream (with temperature approximately 800-1000°C as taught by Pham et al) to preheat incoming water/steam in the system for the purpose of overall energy conservation. Since both the pyrolysis device of Ito et al and the steam electrolyzer of Pham et al required a feed of steam, one of ordinary skill in the art would have been motivated to have utilized the steam so generated to be fed to both devices to reduce reliance on additional energy resources for producing the steam. Specifically, Chiaramonte teaches feeding hot product gases to a heat exchanger along with water to the opposite side of the heat exchanger to form a cooled product gas and steam. This steam is utilized as a reactant at another portion of the system. Thus, one of ordinary skill in the art would have been motivated to have modified the system of Pham et al and Ito et al to have captured excess heat present in the anode product gas stream to generate the steam for feeding to the electrolyzer and pyrolysis furnace in order to conserve energy.

Response to Arguments

5. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

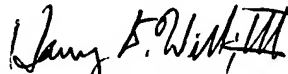
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Harry D Wilkins, III
Primary Examiner
Art Unit 1742

hdw